The X28/29, M-26/-27, Proposed 1923 ARA Design and Related Box & Auto Cars

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The X29/Proposed 1923 ARA Design Box and Auto Cars represented something of a watershed event in the evolution of house car design and, more importantly, acceptance in the railroad community. While the two box car designs of the USRA era were distributed across a wide spectrum of roads, it could not be said that this was the result of acceptance by the railroads and their engineering resources. The USRA designs were the result of government intervention and their acceptance was more through federal decree more than anything else.

History of the Proposed 1923 ARA Design

A committee of the ARA Mechanical Division worked for a couple of years in the early 1920s to develop a standard design for a steel box car. When it was proposed for a vote, the senior committee was not given sufficient time to review the design. It was agreed that the design would be reviewed for consideration at the next meeting. The subsequent vote was favorable. The Mechanical Division recommended the design to the ARA Board for official adoption. A "minority" report was submitted to the Board as well. In reports related to the matter, it appears that some railroads wanted a standard roof design that that would also be compatible with the ARA single sheathed cat (which was officially adopted). This would have necessitated a reduction of the interior width of the all steel car, thereby reducing its cubic capacity. This was not acceptable to the proponents of the steel design. Ultimately, the design was adopted on a provisional basis, with the encouragement of the Board for roads to build cars to the design and report their experience to the Board. (Barkan)

Standard Design Features

All of the single doors cars were characterized by five overlapping steel panels (in various configurations of overlap) on either side of the doors. Most cars used the riveted "lap seam" roof (which was prone to leakage) and the majority of cars also used the flat "riveted" end. All of the box cars had an interior height of 8'7", with the exception of the HPT&D's 10'0" IH cars. The auto cars, with the exception of the CNJ's, had an IH of 9'3", which proved to be inadequate for the auto trade within about a decade (or less) of building. Finally, while the configurations varied, all cars used two stringers (with the exception of the X28 and BPA, which had four total), one on either side of the center sill and a pair each of crossbearers and crossties. One additional "standard design feature" that these cars possessed was the propensity for water to collect on the inside of the bottom of the car sides. This led to almost universal problems with the bottom of the side panels rusting through. The solution was to replace the lower portion of the sides with new pieces of metal, or "patch panels". These patches were a common sight on cars in the 1940's and 1950's.

Pennsylvania Railroad X28/29 Designs

No freight car of the late Steam and early Transition Eras was more ubiquitous than the X29 of the Pennsylvania. There were over 30,000 of the X29s and an additional 5,000 of the X28 auto car version in the Pennsy fleet. The X29 and X28 were the workhorses of the Pennsy house car fleet from the mid-1920's into the 1950's. In addition, thousands were rebuilt into "modern" cars starting in the late 1940's.

The Pennsy bought and built three distinct versions of the X29. Each version had several differences in the application of hardware and/or side sheathing.

"1923" X29

The first, dubbed the "1923" variant, featured the first side sheathing panel configuration. The 1923 type also used two closely spaced door stops, Creco three panel doors and Carmer cut levers. The earliest cars were delivered with arch bar trucks, but deliveries transitioned to the Pennsy standard 2DF4. It is not known when this change occurred.

"1928" X29

The 1928 design marked the first major transition in the design. A new side sheathing pattern was introduced. Most, if not all, cars were equipped with Youngstown corrugated doors. A small number of cars used a transitional door stop arrangement, with two widely spaced stops. However, this was apparently quickly changed to the single bottom door stop that was used on all subsequent X29 deliveries. Finally, the majority of the 1928 cars used a bottom operated rod-type cut lever, as opposed to the Carmer cut lever of the earlier prototypes.

"Late" X29

The "late" X29 was exactly the same as the "1928" design save three main features. The "late" cars

employed inward facing 3/4 Dreadnaught ends. The other changes were the use of the recently introduced 'AB' brake system with a transverse mounted reservoir in conjunction with the Ajax power hand brake and housing.

X28 Auto Car
The X28 was essentially a taller copy of the "1924" X29 with the addition of an auxiliary door. The X28s were rebuilt into single door box cars in the 1930s after they were deemed inappropriate for auto service because of the short 9'3" IH. Many cars received new Youngstown corrugated doors and others retained their Creco three panel doors.

Clones of Pennsylvania Designs
A few roads purchased cars that were exact copies of the Pennsy's X28/29 prototypes.

Baltimore & Ohio M-26B (see section on B&O M-26, -27 cars)

Detroit, Toldeo & Ironton
The DT&I leased two hundred X29s of the 1923 vintage from the Pennsy from the late 1930s until the early 1950s. They were numbered in the 20000-20199 series and were assigned to auto parts service hauling axles. During the Second World War, 150 were renumbered to 18000-18149 and assigned to general service. By the late 1940s, all cars were in general service.

New York Central
In 1925, the New York Central built one hundred cars to the 1923 design at its East Rochester Despatch Shops. The cars were assigned to Lot 504-B and numbered 97000-97099.

Norfolk & Western
The N&W's BPA class cars were copies of the PRR X28 class auto cars. Like the Pennsy, the N&W soon found the 9'3" IH to be inadequate and first sealed the auxiliary doors and then in the 1940's removed the auxiliary doors and plated over the four foot opening. At the same time, the Creco doors were replaced with Youngstown corrugated doors.

Wheeling & Lake Erie
The one thousand cars of the 25000 series on the W&LE were copies of the 1923 X29 design. When the Nickel Plate acquired the W&LE, the cars were progressively relettered to NKP. The 25000 number series remained unchanged.

Baltimore & Ohio Class M-26, -27 / "Standard" Proposed 1923 ARA Design
The Baltimore & Ohio was the second largest owner of the design, with 11,000 copies of the M-26 in six subclasses and 2,000 of the M-27 in two as-built versions and several classes of rebuilds. The B&O's cars are some of the more "fun" prototypes from a historical perspective as they incorporated several interesting design features.

M-26 (265000-266999)
The B&O received 2,000 Class M-26 box cars from Pullman-Standard in 1926. They used the ARA side sheathing pattern, the early ARA design underframe (5'0" kingpin-to-striker and closely spaced crossties – 15-1/2" from car center) with 'KD' brakes and a vertical staff hand brake. Unlike the other B&O classes, they used a single door stop (as built). Later, most were retrofitted with two widely spaced door stops.

M-26A (268000-271499)
From 1926 to 1927, the B&O took delivery of five orders of M-26As from four builders. The –A variant used the ARA side sheathing pattern and the standard ARA underframe with closely spaced crossties (15-1/2" from car center) and 5'0" kingpin-to-striker spacing. The –A class also used a vertical staff hand brakes, 'KD' brakes and a variety of trucks. Cars were delivered with both two closely spaced and two widely spaced door stops.

M-26B (267000-267999)
The M-26B class was unique for the B&O. The 1,000 cars in the class were exact copies of the Pennsy's '1923' X29 with the same side sheathing pattern, two closely spaced door stops, 'KD' brakes, closely spaced crossties and 5'0" bolster-to-striker spacing. The 1,000 cars in this class were built by Bethlehem Steel in 1926.

M-26C (271500-272499)
The M-26C class was built to the specifications of the 'alternate' ARA design. The characteristics of this variant include ARA side sheathing pattern, 3'2-1/2" crosstie spacing (under the door posts) and 5'6" bolster-to-striker spacing. This design is more closely associated with the smaller roads that bought ARA design cars, such as the CNJ, LNE and MEC. The M-26C also used two closely spaced door stops (modified to wide spacing during subsequent shoppings), 'KC' brakes and vertical staff hand

brakes.

M-26D (272500-277999) and M-26E (278000-278999)
Between 1928 and 1931, the B&O received an additional 6,500 cars that became the 'trademark' B&O M-26's because of their Duryea underframes. The –D and –E classes are grouped together because historians have been unable to find any concrete differences between the two classes. All cars in the classes were built by Standard Steel's subsidiary, Baltimore Car & Foundry, in seven groups. The characteristics of these two classes were the Duryea underframes (5'10-3/4" bolster-to-striker spacing), 'KD' brakes, Ajax geared hand brakes and two widely spaced door stops.

M-27 Auto Cars
In 1926, the B&O received 1,000 auto cars (290000-290999) from Standard Steel. They were the same as the M-26A class, but had an inside height of 9'3" (compared to 8'7") and, in addition to a six foot door, the cars also employed a four foot auxiliary door. Starting in 1935, the auxiliary doors were replaced with plate steel sheathing, creating the M-27C class of single door box cars, numbers 280000-280999. Approximately 707 cars were converted (Barkan).

M-27A Auto Cars
The M-27A class (291000-291999, 500 each from Standard Steel and Bethlehem Steel) were the same as class M-27, except that auxiliary were six feet wide, creating a double door car with a twelve foot door opening. The 9'3" inside height quickly proved inadequate and the B&O modified 501 cars (Class M-27B, 295000-295500, creating one of the most interesting freight car prototypes of the Steam/Transition Eras. The increase to 10'0" came through the use of plate steel sections to raise the existing roof. After the modification, the cars were equipped with Evans auto racks. Beginning in 1935, approximately 371 (Barkan) of the unmodified M-27As had their second doors removed and plate steel sheathing applied, creating a six foot single door box car, Class M-27D (281000-281999). Finally, in 1939 and from 1950-1955, 320 of the M-27Bs were converted to single door box cars by removing the auxiliary doors and replacing them with plate steel sheathing.

Other M-27 Conversions
One M-27B had a Wagontop body applied to it. This car was assigned Class M-27E.

In 1943, one member each of the M-27 and M-27A classes had oil tanks installed with unloading outlets installed under the car. M-27G, number 390000, converted from M-27A and M-27H, number 390050, converted from M-27

"Alternate" Proposed 1923 ARA Design
Several roads built cars that differed from the ARA/B&O design. The most common point of differentiation was the move of the crossties to locations under the door posts, increasing the spacing from center from 15-1/2" to 3'2-1/2". Also, all of these cars used a kingpin to striker distance of 5'6". The only B&O prototype that conformed to this "alternate" design was the M-26C class (271500-272499). Some of the cars in this group also used alternative components that make them distinctive when compared to the X29 and ARA Standard designs.

Boston & Maine / Mystic Terminal
The B&M and subsidiary MTC took delivery of twenty-five cars from Baltimore Car & Foundry in 1929. These cars had several distinguishing characteristics that make them stand apart from their siblings. The first is the unique "reverse" three panel doors (these are NOT Creco doors). These doors were only used by B&M and were something of a trademark as they were used on both these 25 cars and their 1,975 single sheathed ARA design cars. The other less noticeable features are the the Duryea cushion underframe and the numerous door guides, rather than the door "tracks" on most of the other cars in this family.

Central of New Jersey
The eight hundred box cars of the 21000 series and the two hundred auto cars of the 19000 series possessed a few distinguishing features. All of these cars were equipped with the Hutchins Dry Lading roof which was a departure from the standard lap seam riveted roof. In addition, all of the CNJ cars employed top hung doors, a characteristic unique to the CNJ's cars. The trucks on the CNJ cars were the Dalman two level prototype. The 19000 series auto cars were also three inches wider than the box cars with an inside width of 9'0" vs. 8'9-1/8" for the box cars. The outer dimensions were similarly different.

High Point, Thomasville & Denton
These cars are arguably the most "modern" of the 1923 ARA/X29 varieties. The HPT&D ordered uncommon cars with Duryea underframes and an inside height of 10'0", an unheard of height for a

box car in 1929. The logical explanation seems to be that the cars were used online for LCL service and possibly for furniture shipments given the road's North Carolina locale; in either case, the HPT&D moved freight that was not dense relative to other lines, meaning that greater cubic capacity in a freight car was a valuable commodity.. In other respects, the cars were true copies of the "Alternate" design. The Creco door was chosen for these cars.

Lehigh New England
Lehigh New England received seven hundred fifty cars in three groups over a span of seven years. The first two groups were what could be termed standard "Alternate" design cars with riveted lap seam roofs, flat riveted ends, ARA side sheathing, underframes with 3'2-1/2" crosstie spacing and 9'10" crossbearer spacing and 5'6" kingpin-to-striker spacing. The last group differed from the first two in having Dreadnaught ends and Murphy panel roofs, creating a prototype that was something of an anomaly compared to the state-of-the-art 1932 ARA design that was being produced at the same time.

Maine Central
In 1929, the Maine Central received 1,004 cars that were based upon the "Alternate" 1923 ARA Proposed design save one major difference. The cars were equipped with the early Viking roof (not to be confused with the Viking roof of the 1930's and early 1940's). These gave the cars a unique look compared to their siblings on other roads. In all other respects, they were standard copies of the "Alternate" version.

Chicago Great Western
From 1930-1933, the Chicago Great Western received 1,500 box cars that were very similar to the Proposed 1923 ARA design, but with a few differences. The most notable from a visual perspective was the "reverse" panel door used on all of the cars. More subtle were the unique side sheathing rivet pattern and the width of the cars, which was three inches narrower than all of the other roads' different prototypes. The CGW also used Duryea underframes on fifty cars (85000-85998 even).

Modified Proposed 1923 ARA Design
Three of the van Sweringen roads built a modified version of the 1923 design that were visually distinctive because of the more modern parts and appliances that were used in construction. The major changes were the move to a "box car" underframe with the crossbearers under the door posts (3'2" from car center) and the crossties roughly centered between the crossbearers and the trucks (8'5-3/4" from car center) and yet another side sheathing/rivet configuration.

Erie
The Erie received the first of the "Modified" design in 1928. The first group (five hundred cars) used Dreadnaught ends and the Climax radial roof. The following two groups of five hundred used Buckeye ends along with the Climax radial roof. All groups received Youngstown doors with Camel hardware.

Chesapeake & Ohio
The C&O cars were assigned to Class B5-2 and arrived in two separate groups – five hundred in the first and one thousand in the second. Both groups used the Climax radial roof and the Dreadnaught end. The first five hundred cars were equipped with Creco doors while the latter one thousand had Youngstown doors with Camel hardware.

Pere Marquette
The last of the van Sweringen roads to receive the "Modified" design was the Pere Marquette. This group of one thousand cars used Hutchins Dry Lading roofs and Dreadnaught ends plus Youngstown doors with Camel hardware.